

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

Original Article

Effect of acupressure on sleep quality of middle-aged and elderly patients with hypertension

Li-Wei Zheng ^{a,*}, Yao Chen ^a, Feng Chen ^b, Ping Zhang ^a, Li-Fang Wu ^a^a Fujian University of Traditional Chinese Medicine, Fuzhou, China^b Department of Cardiology, Fujian General Hospital, Fuzhou, China

ARTICLE INFO

Article history:

Received 15 June 2014

Received in revised form

10 October 2014

Accepted 20 October 2014

Available online 6 November 2014

Keywords:

Acupressure

Hypertension

Sleep quality

ABSTRACT

Purpose: To evaluate the effect of acupressure on blood pressure and sleep quality in middle-aged and elderly patients with hypertension.

Methods: A total of 75 elderly hypertensive patients with sleep disorders were randomly divided into either an experimental group ($n = 38$) or a control group ($n = 37$). All subjects received conventional treatment and health guidance. The experimental group also received acupressure treatment. The score of PSQI (Pittsburgh Sleep Quality Index) and blood pressure were measured and recorded before and after the treatment.

Results: After the intervention, the systolic (SBP) and diastolic blood pressure of the experimental group decreased significantly ($p < 0.01$). There was a significant difference in SBP between the groups ($p < 0.01$). After four weeks of intervention, the total PSQI score in the experimental group was significantly lower compared to the control group ($p < 0.01$).

Conclusion: Acupressure can lower SBP and effectively improve the sleep quality in middle-aged and elderly patients with hypertension.

Copyright © 2014, Chinese Nursing Association. Production and hosting by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

1. Introduction

Hypertension is one of the most common chronic diseases in elderly and the main risk factor for the cardio-cerebrovascular diseases which can be a serious threat to human health. Hypertension has a high incidence rate in China, and the number of people diagnosed with the disease is expected to grow. With the progression of the disease, patients may suffer from

various sleep disorders. A previous survey showed that 63.93% of elderly patients with hypertension had sleep disorders [1]. Sleep disorders can seriously affect the blood pressure in patients suffering from hypertension [2], aggravate the progression of hypertension and interfere with blood pressure control. Furthermore, these sleep disorders are the independent risk factor for complications in patients with other cardiovascular diseases including coronary heart disease and stroke [3]. The common clinical treatment for hypertension in

* Corresponding author.

E-mail address: zhengliwei96@aliyun.com (L.-W. Zheng).

Peer review under responsibility of Chinese Nursing Association.
<http://dx.doi.org/10.1016/j.ijnss.2014.10.012>

2352-0132/Copyright © 2014, Chinese Nursing Association. Production and hosting by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

patients with sleep disorders is administration of hypotensor in combination with sleep medications. However, this long-term medical treatment has many shortcomings, such as poor adherence [4], and adverse reactions. Therefore, it is of clinical importance to explore safe, effective, convenient, and economical non-drug treatments for managing sleep disorders in hypertensive patients. Our study was based on the traditional Chinese meridian theory where a four-week acupressure intervention was applied to treat sleep disorders in middle-aged and elderly hypertensive patients.

2. Subjects and methods

2.1. Subjects

Patients with primary hypertension (grade 1 and 2) were recruited from the cardiology outpatient department in the Grade III General Hospital in the Fujian province from April to December, 2013. The hypertension diagnostic criteria was based on the “Guidelines for Prevention and Treatment of Hypertension in China” [5]. The inclusion criteria were as follows: (1) complained of sleep disorder, Pittsburgh Sleep Quality Index (PSQI) score > 7 ; (2) age ≥ 45 years and primary school education or above; (3) no sleep medication; (4) not receiving acupuncture or acupoint massage therapy within a week before study; (5) informed of the study and agreed to participate. The exclusion criteria were as follows: (1) diagnosis of the secondary hypertension; (2) previous diagnosis of heart, liver, kidney or brain function failure, diabetes or other serious complications; (3) diagnosis of communication disorders, mental disorders, personality disorders, intelligence or thinking abnormalities that cannot be resolved; (4) skin diseases or severe skin damage in the treatment areas.

A random number table was used to recruit 75 subjects who met the above-described criteria for this study. The subjects were randomly divided into either the experimental and control group. In accordance with the outpatients sequence number, the participants were numbered sequentially (1st, 2nd, 3rd ... 75th). Arbitrary numbers, chosen from a random number table, were read along the same direction of 75 numbers corresponding to the following arrangement; odd numbers were assigned to the experimental group and even numbers were assigned to the control group. A total of 38 subjects were recruited for the experimental group, and 37 subjects were recruited for the control group. There were no differences in

age, gender, pathogenesis, antihypertensive, blood pressure or PSQI score between the two groups ($p > 0.05$; Table 1).

2.2. Methods

2.2.1. Conventional treatment and health guidance

All subjects received conventional treatment and health guidance. Based on the individualization principle, patients were treated with a single drug or drug combination which included levamlodipine besylate, hydrogen chlorothiazide, Perindopril, Telmisartan, Valsartan et al. The regular health guidance provided to the participants encompassed information on lifestyle improvements, abstinence from alcohol, reduction in sodium, saturated fat and fat volume intake, and regular exercise. Patients were informed on how to establish a reasonable sleep cycles: 30 min nap at noon and sleep on time at the night. Patients were encouraged to avoid intense mental or physical activity before sleep, refrain from eating too much, drinking coffee, strong tea or any other drinks rich in caffeine. Furthermore, the importance of maintaining the psychological balance and relieve mental stress was emphasized.

2.2.2. Acupressure treatment

The experimental group received acupressure treatment in addition to the conventional treatment and health guidance. The acupoint selection (double sides) included Shenmen (Heart 7) and Taixi (Kidney 3). Shenmen is positioned on radial flange of ulnar wrist flexor and ulnar side of the volar wrist stripes; Taixi is the midpoint between the highest point of medial malleolus and flange of Achilles tendon. Prior to the treatment, subjects washed their hands, trimmed their nails and took a comfortable position. Shenmen and Taixi were rubbed using thumb on the acupuncture points. The area positioned 2 cm from the point was rubbed rhythmically with the force that came from the forearm and wrist. The force was strengthened gradually till the patient felt soreness, local numbness, and even warmth. The acupressure was applied 5 min per point once or twice per day (before the noon break and night sleep, a total of 40 min per day of acupressure). The whole intervention lasted four weeks.

2.2.3. Acupressure guidance of patients and the assessment

The method of acupoint selection, acupressure skills and the key acupressure points were explained to subjects. The acupressure points were demonstrated in the form of small cards to strengthen their effectiveness.

Table 1 – Comparison of subjects between groups before the treatment.

Group	n	Age (years)	Gender (cases)		Pathology (years)	Antihypertensive (species)		SBP (mmHg)	DBP (mmHg)	PSQI
			Male	Female		1	2			
Experimental group	38	59.84 \pm 7.20	14	24	9.16 \pm 5.30	23	15	136.21 \pm 11.94	78.37 \pm 9.49	12.16 \pm 2.80
Control group	37	58.95 \pm 8.29	12	25	8.43 \pm 4.43	23	14	133.08 \pm 11.39	78.86 \pm 8.91	11.68 \pm 3.12
t/χ^2		–1.195	0.161		0.652	0.021		1.161	–0.273	0.705
p		0.232	0.688		0.516	0.884		0.250	0.785	0.483

SBP = systolic blood pressure; DBP = diastolic blood pressure; PSQI = Pittsburgh Sleep Quality Index.

Acupressure show-how: a step-by-step demonstration of acupoint selection was provided to the subject in parallel with an illustration. The subject was then encouraged to find acupoints by themselves under the guidance of experimenter. The experimenters asked the participants to evaluate their feelings during the process of acupressure.

The strengthening exercises and examination: upon learning acupoint selection and treatment methods, subjects mastered the acupressure through repeated practice until able to perform it independently without guidance. The mastering of the subjects' acupressure was evaluated according to the operation grading standards established by the experimenter and massage specialists. The assessments were conducted twice. The subjects had to receive the score of 80 or above for both assessments before receiving a passing grade for the assessment and complete mastering of the acupressure methods.

Compliance monitoring: subjects were monitored once a week during the clinic service to examine and evaluate the acupressure method. The participants were followed up twice a week by phone to remind them to self-treat on time. The experimenters provided the experimental group subjects with a homemade "acupressure diary" to supervise and record the subjects' self-treatments. The subjects' compliance was calculated by using the actual operating times/28%. In this study, the diary recovery rate was 100%. The subjects' treatment completion rate was 86%.

2.2.4. Evaluation indicators

2.2.4.1. Blood pressure. The subjects' blood pressures were measured by Omron® electronic sphygmomanometer after waking up in the morning. The blood pressure of every subject was recorded five times: pre-intervention, week 1, week 2, week 3 and week 4 after intervention. In every time blood pressure are measured twice with 1–2 min intervals. The average results were recorded. The variance analysis of repeated measurement data was used to compare the differences in blood pressure between two groups before and after the intervention.

2.2.4.2. Pittsburgh sleep quality index (PSQI) [6]. The PSQI was used to assess subjects' sleep quality in the recent month. The 17 scoring items in this study were combined into six components: the sleep quality, time to sleep, sleep time, sleep efficiency, sleep disorder and daytime dysfunction. Each component used Likert4 grade score (scored from 0 to 3), and scores were summed into a total of 0–21 points. The higher the PSQI, the worse the sleep quality. The PSQI >7 is

considered to indicate a sleep disorder [7]. The experimenters guided the subjects one-on-one on how to use PSQI both pre-intervention and after a 4-week intervention. Any missed or wrongly filled questionnaires were followed-up in time in order to control the quality of recycling questionnaire.

2.2.5. Statistical methods

Data were analysed using SPSS 16.0 (YOU NEED TO PROVIDE TOWN, COUNTRY FOR THIS VERSION OF SOFTWARE). The count data used χ^2 test. After the normal test, Student's *t* test (results expressed as $\bar{x} \pm s$) was used for the measurement data with the normal distribution, otherwise, a rank sum test (results expressed with the median) was used. Repeated measurement data, such as a comparison of blood pressure values, were analysed by variance analysis of repeated measurement.

3. Results

3.1. Comparison of blood pressure between groups before and after the intervention

There were significant differences between two groups in time, grouping, and the interaction time and grouping factors in systolic blood pressure (SBP) after variance analysis of repeated measurement ($p < 0.01$; Table 2). The subjects' SBP had a tendency to change as time goes on and the role time played varied between the groups. However, there was no significant difference of diastolic blood pressure (DBP) between groups.

3.2. Comparison of PSQI between groups before and after intervention

Compared to pre-intervention, the PSQI scores in both groups were lower after intervention ($p < 0.01$; Table 3). However, the experimental group's PSQI scores reduced significantly more than the control group ($p < 0.01$; Table 3).

4. Discussion

Acupressure treatment, also known as acupoint massage, refers to medical staff using their fingers to impose different acupoint pressures directly on the patient body surface depending on the patient's diseases to treat diseases [8]. The first mention of acupressure dates to the ancient book "Ling Shu" where it was described as finger pressing on acupoints

Table 2 – Comparison of blood pressure between groups in different time ($\bar{x} \pm s$).

Items	Groups	Pre-intervention	After the intervention				F_{time}	F_{grouping}	$F_{\text{interaction}}$
			1 week	2 weeks	3 weeks	4 weeks			
SBP (mmHg)	Experimental group	136.21 \pm 11.94	130.16 \pm 7.86	125.37 \pm 8.93	122.32 \pm 8.27	118.61 \pm 6.66	29.158 [†]	15.645 [†]	23.561 [†]
	Control group	133.08 \pm 11.39	138.81 \pm 11.03	134.70 \pm 11.06	135.84 \pm 11.80	132.73 \pm 12.22			
DBP (mmHg)	Experimental group	78.37 \pm 9.49	78.74 \pm 11.42	76.58 \pm 9.41	75.58 \pm 8.60	73.47 \pm 7.17			
	Control group	78.86 \pm 8.91	75.95 \pm 8.92	77.08 \pm 11.51	76.59 \pm 8.89	76.92 \pm 8.45			

* $p < 0.05$; [†] $p < 0.01$.

SBP = systolic blood pressure; DBP = diastolic blood pressure; F = XXX.

Table 3 – Comparison of Pittsburgh Sleep Quality Index between two groups before and after intervention ($\bar{x} \pm s$).

Groups	n	Pre-intervention	After the intervention	t	p
Experimental group	38	12.16 \pm 2.80	7.37 \pm 3.98	8.229	0.000
Control group	37	11.68 \pm 3.12	9.81 \pm 3.76	3.876	0.000
t		0.705	–2.766		
p		0.483	0.006		

recuperates the qi by acting on meridian. The acupuncture treatment uses techniques to stimulate points that act indirectly on meridian allowing for strong running of qi and blood. The treatment can also act on the transmission and reflection of meridians to adjust the function of viscera [9]. Modern medicine has shown that the strong stimulation of acupoints can inhibit the cerebral cortex function, while the rhythmic gentle massage stimulation can make the alpha wave stronger, achieving calm, relieving tension and fatigue of the brain [10]. In addition, acupressure can increase the body's release of serotonin that can relax the body and promote sleep [11]. Hence, using acupressure to improve sleep of patients with hypertension is a viable option.

According to the results of Table 2, there was a significant difference in SBP between groups in different times. The SBP of the experimental group was significantly lower than the control group after intervention. Therefore, acupressure can effectively lower SBP in middle-aged and elderly patients with hypertension, and help improve the antihypertensive effects. Sleep quality and blood pressure influence each other. Improving the sleep quality of patients can help reduce patient's blood pressure [2]. Previous studies also showed that the acupuncture point massage was a good antihypertensive auxiliary treatment. Pressing the acupoint can promote flow of meridian qi and blood, adjust Yin and Yang, and make blood pressure return to normal [12]. Massage itself can relax muscle, relieve tension, expand the surrounding blood vessels, reduce peripheral circulation resistance, and improve blood vessel compliance lowering the blood pressure. Modern medical research also found that stimulating acupoint could normalize neural and humoral factors, and expand the resistance blood vessel [13]. However, the acupressure treatment could not lower DBP effectively in our study. The reason may be related to subjects themselves who mostly had systolic hypertension or the sample size which should be increased in the further study.

The results of Table 3 showed that the PSQI of the experimental group was lower than that of the control group after intervention ($p < 0.01$). The acupressure to Shenmen and Taixi effectively improved the sleep quality of our participants. The traditional Chinese medicine bases the pathology of sleep disorders on the deficiency of the viscera, old age, kidney failure, shortage of kidney water impossible to nourish heart, heart-kidney imbalance, or long pains due to imbalance of yin. As a result, the blood of heart and spleen is hurt, heart gets displaced, the state of mind gets damage, so one cannot fall asleep [14]. Therefore, the key treatment is nourishment of yin and coordination of heart and kidney. This research followed the traditional Chinese medical theory that “when five zang-organs have disease, choose the 12 original acupoint for treatment”. Shenmen and Taixi belong to the original acupoint of the heart meridian of hand-shaoyin and kidney

meridian of foot-shaoyin. Heart channels the energy and plays a leading role in sleep. Shenmen, the heart' original acupoint, can nourish the heart, soothe the energy, and guide the energy into the shed. Modern medicine has shown that stimulating Shenmen can improve the γ -aminobutyric acid content of cerebrospinal fluid, generate the inhibitory effect on the central nervous system and promote sleep [15]. Taixi, the original acupoint of the kidney meridian, can replenish vital essence, tone the kidney-yin, nourish liver and kidney, using the “strengthening renal yin to inhibit predominant yang” method to improve sleep. Previous studies have shown that pressing or prickling Shenmen or Taixi can effectively improve the sleep quality of patients with chronic insomnia by improving their sleep efficiency remarkably [16,17].

This study confirmed that pressing on Shenmen and Taixi, based on the theory of traditional Chinese medicine, not only can help reduce SBP in middle-aged and elderly patients with hypertension, but can also effectively improve the sleep quality. This method is non-invasive, economical, effective, painless, and easily accepted by the majority of patients and family members. It is also easy to promote. Therefore, the method can be regarded as a safe and effective therapy for improvement of sleep in patients with hypertension. The limitations of this study are its short intervention and follow-up periods which will need to be expanded in the future studies in order to determine the long-term effect of acupressure in treatment of sleep disorders in patients with hypertension.

Conflict of interest

We declare no conflict of interest with respect to the research and/or publication of this article.

REFERENCES

- [1] Cheng MF, Wang XL, Zhong ZY, Zhang JP. Sleep quality in elderly hypertensive patients in university communities and correlation analysis of coping style. *Chin J Health Manage* 2010;4(3):168–70.
- [2] Li HC, Yang YL, Ma M, Li QB, Yang XQ, Tian X, et al. Improvement of Somnipathy is effective for antihypertensive therapy. *South China J Cardiol* 2007;15(4):294–8.
- [3] Eguchi K, Hoshida S, Ishikawa S, Shimada K, Kario K. Short sleep duration is an independent predictor of stroke events in elderly hypertensive patients. *J Am Soc Hypertens* 2010;4(5):255–62.
- [4] De Geest S, Sabaté E. Adherence to long-term therapies: evidence for action. *Eur J Cardiovasc Nurs* 2003;2(4):323.

- [5] Chinese hypertension Guide Revision Commission. Guidelines for prevention and treatment of hypertension in China 2010. *Chin J Cardiovasc* 2011;39(7):579–615.
- [6] Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989;28(2):193–213.
- [7] Li JM, Chen CC, Zhao YL, Liu XP, Wu LM. Study on the correlation between sleep and memory problems in the elderly in community. *Chin J Nurs* 2011;46(6):592–5.
- [8] Liu XF, Hu YL, Long XH, Zhang YY, Liang ZJ, Huang Y, et al. Point the pointer method influence on quality of sleep in patients with end-stage renal disease. *Chin J Nurs* 2010;45(9):781–3.
- [9] Zeng H, Wang P, Kang JX. Acupressure training on the effect of improving the quality of sleep and cognitive functions in the elderly. *Chin J Nurs* 2012;47(9):773–6.
- [10] Wang ZH, Yu TY. *Science of chinese massage*. Beijing: China: Traditional Chinese Medicine Publishing House; 2012. p. 37–42.
- [11] Tsay SL, Rong JR, Lin PF. Acupoints massage in improving the quality of sleep and quality of life in patients with end-stage renal disease. *J Adv Nurs* 2003;42(2):134–42.
- [12] Yin AL, Xiao CG, Fu CH, Li ZG. Effects of massage and acupressure on lowering high blood pressures of patients with stroke. *Chin J Nurs* 2007;42(2):110–2.
- [13] Zhang HM, Fei ZT, Shi ZJ, Jia BH, Tu Y. Dynamic observation of acupuncture “Baihui” “Taiyang” improvements in focal cerebral ischemia of brain microvascular endothelial cell function. *Acupunct Res* 2006;31(2):67–72.
- [14] Yao XT, Dou LP, Yang Q. Study on TCM syndromes of hypertension and insomnia. *Zhejiang J Integr Tradit Chin West Med* 2012;22(6):494–5.
- [15] Pi M, Du SH, Zhang Y. Acupuncture for treatment of insomnia and the study on the effect of γ -aminobutyric acid. *J Jiangxi Univ Tradit Chin Med* 2000;12(4):160.
- [16] He CH, Tan FY. Acupressure cure insomnia. *Chin Assoc Rehabil* 2009;24(3):196.
- [17] Yang WH. Taixi acupuncture as main therapy in 50 cases of obstinate insomnia. *Shanxi Zhongyi* 2009;25(10):33.